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BY THE COMPTROLLER GENERAL

Report To The Chairman, Committee On Government Operations, House Of Representatives

OF THE UNITED STATES

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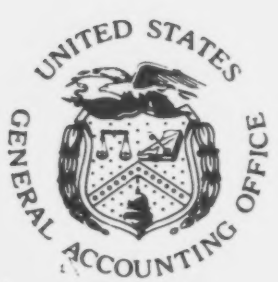
Social Security Administration's Computer Systems Modernization Effort May Not Achieve Planned Objectives

The Social Security Administration (SSA) relies heavily on computers to disburse billions of dollars to beneficiaries each year. By the late 1970s the agency's automated systems had degenerated to a point that its ability to perform its mission was affected. In 1982, SSA initiated a $500-million plan to modernize its computer systems. SSA now estimates the program will cost $863 million through fiscal year 1989.

SSA has made some progress in modernizing these systems; however, a critical part of the plan--software--is behind schedule. Further, SSA has not followed the original plan's approaches. Although SSA has taken some actions to improve its management and control over the plan, recurring problems still impede progress. GAO is concerned that SSA's approach to implementing the modernization plan may not achieve stated objectives.



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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON D.C. 20548

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The Honorable Jack Brooks
Chairman, Committee on
Government Operations
House of Representatives

Dear Mr. Chairman:

This report responds to your July 28, 1983, request that we review the implementation of the Social Security Administration's (SSA's) Systems Modernization Plan. We found that, although SSA has made some progress, it has not fulfilled the plan's initial objectives to upgrade existing software and has limited capability to manage and control the entire plan. In addition, we expressed concern about certain aspects of the SSA systems' redesign (i.e., the data base and data communications technologies), which may hinder SSA's modernization efforts.

As arranged, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days from its issue date. We will then send copies to the Secretary of Health and Human Services and make copies available to other interested parties upon request.

Sincerely yours,

Milton J. Socolar

Acting Comptroller General
of the United States

PURPOSE OF THIS REVIEW

The Social Security Administration (SSA) depends on computers to do its job. In fiscal year 1984, SSA paid out about $163 billion to about 39 million beneficiaries, recorded the earnings of about 60 million wage earners, and maintained records on about 250 million people. SSA's automated systems had degenerated by the late 1970s to a point that its ability to perform its mission was affected. SSA cited such problems as late and erroneous benefit payments. In 1982, with congressional approval, SSA began a $500-million, 5-year project to modernize its computer systems. SSA currently estimates the program will cost $863 million through fiscal year 1989. The Chairman of the House Government Operations Committee asked GAO to answer the following questions:

Is the $500-million plan on schedule and being fully implemented?

Is the plan's proposed software upgrade adequate and on schedule? and

Has SSA taken the necessary management actions to improve its automatic data processing personnel situation?

BACKGROUND

SSA's original Systems Modernization Plan was comprehensive, encompassing improvements in software, equipment, personnel training, and recruitment. The plan consisted of four programs--Software Engineering, Data Base Integration, Data Communications Utility, and Capacity Upgrade Programs.

The plan focused on software as an important, integral part of the modernization. It required that first SSA develop proper software standards and improve its existing software. Second, SSA was to integrate the improved software with newly developed systems. These actions would salvage in part the high investment in the existing software and avoid the risks of a "tear it down and start anew" approach.

The plan also described how SSA would manage and control the large and complex modernization project. Other initiatives were hiring and

training people in the new systems' technology, and selecting a contractor to integrate hardware and software tasks and to provide project continuity among the plan's programs.

RESULTS IN BRIEF

SSA has made some progress in modernizing its systems; however, a critical part of the plan--software--is behind schedule. Further, SSA has not fully implemented its approach to software; rather, it shifted emphasis from establishing software standards and improving existing systems to building new systems. SSA has also deviated from the plan's approach by describing a concept for a data base architecture that appears to be beyond the state of the art.

Although SSA has taken some actions to improve its management and control over the plan, recurring management problems still impede progress. SSA did not effectively monitor the systems engineering and integration contractor, which resulted in inadequate integration of the software and hardware tasks and lack of project continuity. Further, SSA's personnel resource constraints still exist.

GAO is concerned that SSA's approach to implementing the modernization plan may result in its not achieving a modernized system--leaving it in much the same circumstances as it was in 1982. SSA recently indicated that it is planning to bring its implementation approach more closely in line with the plan's original strategies.

PRINCIPAL FINDINGS

SSA's modernization plan consisted of four programs. Improvements in three--primarily through hardware acquisition--helped alleviate the system's crisis condition by increasing system capacity, improving response time, and enhancing data access. (See pp. 9 to 15.)

Plan's Progress

However, progress in the fourth program--software engineering--is seriously behind schedule. The task of developing software standards is incomplete because of inadequate management attention and staff constraints. Further, important software improvement projects have been delayed up to 4 years, or cancelled entirely, in part because software standards are incomplete. (See pp. 15 to 18.)

Software Upgrade

SSA did not focus on software as planned. SSA shifted its resources and emphasis to building new systems instead of first developing a proper software environment and improving its existing systems. SSA is now using a risky approach to software redesign, which if it fails could put SSA back in another total system crisis by the 1990s.

Because of the severe complexity and poor condition of the existing software, SSA's first attempts at software upgrade were unsuccessful. Further, based on a limited analysis, SSA decided not to make extensive use of its huge software investment. Without the software upgrade in place, there is not a proper foundation for software redesign projects; as a result, SSA is encountering delays and technical problems. (See pp. 19 to 27.)

Data Base Integration Program

Another of the plan's programs--data base integration, which is principally aimed at ensuring efficient use of the system's data--deviated from the plan's original strategies. SSA's current data base architecture concept calls for a technology that appears to be beyond the state of the art and may ultimately delay the plan's implementation. (See p. 28.)

Recurring SSA Management Issues

Previous GAO reviews have identified serious SSA management weaknesses that have prevented SSA from correcting its computer systems problems. These included: (1) lack of effective planning, control, and monitoring of systems' projects, and (2) problems hiring qualified automatic data processing personnel. GAO's present review has identified that these same management problems still exist and have adversely affected the plan's progress. (See pp. 29 and 30.)

SSA did not effectively monitor the systems engineering and integration contractor; consequently, systems integration and continuity among the plan's major programs were not provided. SSA diverted the contractor from integration activities to performing detailed software tasks. Further, SSA did not effectively use some contractor products. These problems contributed to the contract's cost increasing

	to over $22 million by July 1985; it is currently projected to almost $32 million through March 1987. (See pp. 30 to 34.) SSA has made some progress in improving staff recruitment and training; however, personnel actions are still hampered primarily by salaries that are not competitive with those of the private sector. These constraints also adversely affect the software upgrade activities. (See pp. 34 to 36.)
RECOMMENDATIONS	Recognizing that SSA is planning to change its approach to implementing the plan, GAO recommends a number of actions that it believes the SSA Commissioner should include in that effort. Specific actions relate to the Software Engineering Program, the Data Base Integration Program, the Data Communications Utility Program, and the management of program integration. (See pp. 39 and 40.)
AGENCY COMMENTS	GAO did not obtain the views of responsible officials on its findings, conclusions, and recommendations, nor did GAO request official agency comments on a draft of this report.

Contents

		Page
EXECUTIVE SUMMARY		i
CHAPTER		
1	INTRODUCTION	1
	Accomplishment of SSA's mission depends on computers	1
	SSA's 1982 system crisis	1
	Systems Modernization Plan--a proposed cure	2
	Previous analyses of SSA's 1982 plan	4
	Objectives, scope, and methodology	5
	Report presentation	7
2	SYSTEMS MODERNIZATION PLAN STATUS: SOME PROGRESS, HOWEVER, KEY OBJECTIVES HAVE NOT BEEN ACHIEVED	9
	Modernization plan costs	10
	Capacity Upgrade Program has substantially met its objectives	10
	Data Base Integration Program met main objectives	11
	Data Communications Utility Program met most of its objectives	13
	Software Engineering Program did not meet its main objectives	15
3	THE SOFTWARE ENGINEERING PROGRAM IS BEHIND SCHEDULE AND CONCERNS EXIST ABOUT ITS APPROACH	19
	Initial software plan appeared appropriate	20
	Shift in the software upgrade and inadequate software progress may increase the risk of accomplishing system redesign	21
	SSA's data base plans depend on unproven software technology	23
4	RECURRING MANAGEMENT ISSUES STILL ADVERSELY AFFECT MODERNIZATION PLAN PROGRESS	29
	SSA's past management problems	29
	SSA's problems in effective planning, managing, and controlling computer operations continue	30
	ADP staffing resources have improved, however, deficiencies still exist	34

CHAPTER		Page
5	CONCLUSIONS AND RECOMMENDATIONS	37
	Conclusions	37
	Recommendations	39
APPENDIX		
I	Goals of SSA's Systems Modernization Plan	41
II	Governing strategies of SSA's Systems Modernization Plan	42
III	Letter dated July 28, 1983, from the Chairman, House Committee on Government Operations	45

ABBREVIATIONS

ADP	Automatic data processing
AMIE	Administrative Management Information and Engineering
CUP	Capacity Upgrade Program
DBI	Data Base Integration
GAO	General Accounting Office
HHS	Health and Human Services
MMCS	Modernization Management and Control System
RFP	Request for Proposals
SE&I	Systems Engineering and Integration
SEP	Systems Engineering Program
SMP	Systems Modernization Plan
SOMP	System Operation Management
SSA	Social Security Administration

CHAPTER 1

INTRODUCTION

The Chairman of the House Committee on Government Operations requested that we perform a comprehensive review of the Social Security Administration's (SSA's) plan to modernize its computer systems (see appendix III). We were requested to determine if: (1) the $500-million modernization plan (now estimated to cost about $863 million) is on schedule and is being fully implemented, (2) the software upgrade proposed in the plan is adequate and on schedule, and (3) SSA has taken the necessary management actions to improve its personnel situation. The Chairman requested the review because of the Committee's concern that SSA's needs may not be met by its modernization plan and may delay correcting what the Committee believes are SSA's most pressing problems--the necessity for efficient software and the need to hire qualified automatic data processing (ADP) personnel.

ACCOMPLISHMENT OF SSA's MISSION DEPENDS ON COMPUTERS

Computerized operations play a critical role in SSA's accomplishing its mission. SSA's primary responsibilities are to administer the Retirement, Survivors, and Disability Insurance Program and the Supplemental Security Income, Aged, Blind, and Disabled Program. SSA also provides substantial operational support to other governmental entities administering related programs such as Medicare and Aid to Families with Dependent Children.

SSA has responsibility for programs affecting millions of wage earners and Social Security beneficiaries. In fiscal year 1984, SSA used computers to pay about $163 billion to approximately 39 million beneficiaries in two of its major programs, record the earnings of about 60 million wage earners, and maintain records on about 250 million people.

SSA's 1982 SYSTEM CRISIS

SSA's computer systems served as a model for other users of automated data processing throughout the 1960s. By the end of the 1970s, however, they were close to collapse and unable to process much of the work. By 1982, the systems were obsolete, were difficult to maintain, and were vulnerable to failure. System deficiencies were apparent in all aspects of SSA's ADP environment, including software and hardware. The potential and/or actual consequences of these system deficiencies were described as including grave risk of failing to pay Social Security benefits, inadequate responsiveness to legislative changes, exposure to the risk of fraud, and inadequate services to the public. SSA itself

cited such examples of inadequate services to the public as: (1) delayed posting of earnings for up to 3 years, (2) slow issuance of Social Security cards, and (3) erroneous benefit payments.

Poor service to the public resulted directly from SSA's computer hardware and software problems. Inadequate hardware capacity caused computer processing delays of posting earnings and issuing benefit payments. Further, the computer devoted to testing and developing computer programs was saturated, delaying the improvement, development, and maintenance of software. Serious system development and software deficiencies also existed. SSA had millions of lines of patchwork software. None of these computer programs was fully documented according to the Federal Information Processing Standards. This necessitated labor-intensive manual processes and inhibited changing to advanced computer processing technology.

SSA stated that many of its systems' deficiencies were caused by recurring management problems. Noting that although it had made previous attempts to modernize its systems, SSA said these efforts were unsuccessful primarily because of: (1) inadequate management attention; (2) changing priorities; (3) staffing deficiencies; and (4) ineffective planning and control processes.

SYSTEMS MODERNIZATION PLAN-- A PROPOSED CURE

In 1982, SSA proposed a 5-year Systems Modernization Plan (SMP) estimated to cost approximately $500 million.[1] In 1985, SSA issued a plan update that addressed the agency's progress and identified changes in its approach to modernizing its systems. The plan was intended to restore SSA to a model of efficiency in systems operations and to enable it to respond promptly to new legislation and safeguard funds and personal data.[2] Further, the modernization plan would enable SSA to perform routine processing more quickly and upgrade the efficiency of its existing software. In 1982 the Congress approved the plan and SSA initiated implementation.

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[1]In its 1985 SMP update SSA estimated that the SMP's total cost will be about $863 million and its scheduled completion will be 1989.

[2]Our report, Social Security Administration's Progress in Modernizing Its Computer Operations (GAO/IMTEC-85-15, Aug. 30, 1985), discusses SSA's progress under the SMP with regard to responding to legislation and safeguarding funds and personal data.

The plan's goals and strategies

The strategic plan for the systems modernization took into account our concerns as well as those of the Congress and the General Services Administration, and set forth the long-range ADP goals of SSA (see appendix I). These included improving quality and timeliness of data processing, staff effectiveness, and client service by restoring excellence to the Social Security Administration ADP systems.

To achieve these goals, SSA developed a set of governing strategies to guide its modernization efforts (see appendix II). These strategies represented broad principles that were to go beyond the 1982 plan and provide the continuity for future plan updates. They gave the plan a sound strategic foundation.

The main thrust of the strategies was to achieve systems modernization through a series of minimal risks and economical methods by using:

--A phased, incremental engineering approach to the design and development of the new systems. Small, manageable steps with well-defined releases of the new system's increments were to occur to ensure control and workability of systems components prior to their use.

--A technical approach that called for software improvement to be an integral part of SSA's strategy for obtaining future systems. This was desired to preserve the value of SSA's past software investment and avoid the dangers of failure inherent in the "tear it down and start anew" approach.

--An organizational strategy that clearly separates operation and maintenance of existing systems from the building of new systems to (1) avoid disrupting the existing system's operation and (2) ensure that development of the new system is completed.

--A systems engineering approach that maximized use of contractors experienced both in state-of-the-art technology and the application of integration/project management techniques to ensure life-cycle project continuity.

These strategies were different from past SSA approaches that focused on buying more hardware and adding more people, rather than integrating the software and hardware improvements for the system into a single plan. Although computer capacity was recognized as a deficiency that must be dealt with, the plan did not propose to rely primarily on a hardware solution. SSA's approach also

recognized that software improvement activities were necessary to identify specific requirements to be accomplished by the redesigned software systems.

Project phases and programs

Based on the strategies, the SMP was divided into three phases: survival, transition, and state of the art. The first phase, "survival," was to be accomplished in the first 18 months (March 1982-August 1983) and the "transition" phase was to be completed in the next 18 months (August 1983-March 1985). SSA defined its survival phase as immediate action to provide the necessary improvement in ADP capability and capacity to enable it to survive its ADP crisis. The transition period involved implementing those changes required to put SSA into a modern data processing environment and pave the way for final transition to the state-of-the-art operation. The final phase was planned for the last 24 months of the 5-year plan (March 1985-February 1987).

During these three phases SSA planned to concurrently implement four major programs. They included tasks that needed to be completed in sequence if SSA were to achieve the plan's goals. The programs were:

Capacity upgrade: Purchase computers and peripheral equipment to replace the inadequate hardware and to correct problems caused by insufficient and obsolete hardware.

Data communications utility: Build a modern telecommunications system that would make the automated systems interactive, thus providing quicker service to the public.

Data base integration: Move the data files from a slower recording medium (tape) to a faster one (disk); document, organize, and redesign SSA's data bases; and eventually move to a state-of-the-art environment in managing data, which would be more responsive to change and would better protect the data.

Software engineering: Establish an incremental process through which SSA would first document and analyze its existing software and then develop new software and systems to replace inefficient software.

PREVIOUS ANALYSES OF SSA's 1982 PLAN

GAO and the House Committee on Government Operations provided the following comments on SSA's 1982 SMP.

GAO

We reviewed the SMP in 1982 and in general, we believed the approach was an excellent, necessary first step toward achieving systems modernization; however, we found that it needed improvement in some areas.[3] We concluded that the SMP presented a logical, systematic approach for solving SSA's pressing ADP problems. We agreed that better software documentation standards and practices would address SSA's problems in developing software and systems--if criteria for these standards and practices were strictly followed. We cautioned, however, that deficiencies in SSA's ability to recruit needed staff and slippages of key early SMP actions, such as hiring a contractor to integrate activities among the plan's programs, would hinder the plan's progress.

While we endorsed the SMP approaches and strategies, we estimated that to fully implement the plan would take at least 7 to 10 years or longer instead of the projected 5 years and would cost considerably more than the original estimate of $500 million.

House Committee

In 1982, the House Committee on Government Operations reported that it was encouraged by the SSA Commissioner's plan to address the most serious problems facing SSA--software and personnel issues.[4] However, the committee was concerned that the plan's survival phase was essentially another hardware solution that would, at best, only temporarily delay the continuing deterioration of SSA's computer operations.

OBJECTIVES, SCOPE, AND METHODOLOGY

Our objectives were to respond to the questions raised in the Chairman's letter. In addition, in subsequent discussions, the Chairman's office expressed interest in our reviewing the Systems Engineering and Integration (SE&I) contractor's involvement with the SMP. The Chairman also asked us to thoroughly review all contracts with the Paradyne Corporation, including one for software, to ascertain if allegations of possible fraud and misrepresentation had merit. With the Chairman's agreement, we completed work on the Paradyne issues first, which resulted in two

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[3]Examination of the Social Security Administration's Systems Modernization Plan (GAO/HRD-82-83, May 28, 1982).

[4]House Report No. 97-900, Sept. 30, 1982.

reports relating to the Paradyne contract.[5] At the completion of the Paradyne work, we initiated work on the remainder of the Chairman's questions.

To determine the status of the plan's implementation, we reviewed SSA's 1982 SMP in detail, compared it to the January 1985 SMP update, and looked at steps SSA took to implement the plan. Specifically, we assessed the extent to which SMP objectives for the survival and transition phases had been achieved. The plan's initial two programs were scheduled to be completed in March 1985. To do this, we determined whether tasks under each program critical to achieving the objectives of the plan's initial two phases had been completed on schedule. Where all such tasks had not been completed, we judged a program as not fully meeting objectives of the initial phases. We also determined the status of survival and transition tasks that primarily support the objectives of the state-of-the-art phase. Tasks primarily supporting this phase were not considered in our judging whether the objectives of the initial phases had been achieved.

We interviewed numerous SSA officials responsible for the implementation of all major programs in the SMP. Major SMP programs were Software Engineering, Capacity Upgrade, Data Communications Utility, and Data Base Integration. Two programs have been added to the SMP since 1982--System Operation and Management, and Administrative/Management Information Engineering. We only gathered general information on these programs. We obtained SSA cost records for the SMP; however, we did not verify the data or perform an in-depth analysis of it.

We also discussed the SMP's status with SSA's SE&I contractor (Electronic Data Systems Corporation) who was hired to support the systems modernization effort. We obtained the contractor's views and opinions and reviewed related documents, including the Request for Proposals (RFP), contract, and contract modifications.

To further assess the SMP status, we evaluated SSA's data base architecture RFP, and private industry's responses. In addition to interviewing SSA officials on its data base architecture concept,

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[5]Social Security Administration's Data Communications Contracts with Paradyne Corporation Demonstrate the Need for Improved Management Controls (GAO/IMTEC-84-15, July 9, 1984) and Additional Information on the Social Security Administration's Management of Data Communications Contracts with Paradyne Corporation (GAO/IMTEC-84-23, Aug. 27, 1984).

we also obtained the views of a private consultant to assess the reasonableness and risks involved in that concept.

To assess the adequacy and schedule of the software engineering program (the software upgrade), we analyzed the extent to which current strategies deviated from the strategies contained in the 1982 plan. Where such deviations existed, we assessed their adequacy and associated risks. We also reviewed pertinent SSA documents such as the SMP tactical plans, Business System Planning methodology, and the top-down analysis of SSA's system functions. These documents showed the process for examining SSA's system requirements. To determine software upgrades performed, we interviewed officials of SSA, the General Services Administration (which oversees federal agencies' purchase and use of ADP equipment), and companies responsible for three major software improvement projects. We also discussed with Health and Human Services' Office of Inspector General its previous and ongoing work relating to the software engineering program. In addition, we reviewed its reports pertinent to our audit.

Regarding the training and recruitment of ADP personnel, we interviewed managers in SSA's Office of Management, Budget, and Personnel and Office of Systems responsible for training and recruitment. We also held discussions with the officials at the Department of Agriculture's Graduate School, SSA's contractor responsible for training. We also analyzed Department of Labor's statistical reports on government and private-sector pay scales for computer personnel.

We conducted our work at SSA headquarters in Baltimore, Maryland; and SSA field offices in York, Pennsylvania; Silver Spring, Maryland; and Atlanta, Georgia, between December 1984 and September 1985.

We sought the views of numerous responsible SSA officials during the course of our work. However, in accordance with the requesters' wishes, we did not obtain the views of these officials on our findings, conclusions, and recommendations; nor did we request official agency comments. Except as noted above, we performed our work in accordance with generally accepted government auditing standards.

REPORT PRESENTATION

In the following chapters we discuss our review of SSA's modernization plan:

--Chapter 2 provides information on the SMP's status for the period of March 1982 through March 1985--the survival and transition phases.

--Chapter 3 analyzes the adequacy and implementation of SSA's software engineering program.

--Chapter 4 analyzes SSA's management of the SMP's implementation, including recruitment and training of ADP personnel.

--Chapter 5 provides our conclusions and recommendations regarding SSA's overall progress in implementing its Systems Modernization Plan.

CHAPTER 2

SYSTEMS MODERNIZATION PLAN STATUS: SOME PROGRESS, HOWEVER, KEY OBJECTIVES HAVE NOT BEEN ACHIEVED

We reviewed the progress SSA made in implementing its 1982 Systems Modernization Plan for the survival- and transition-phase objectives that were to be completed by March 1985. We compared SSA's actual accomplishments in each of the plan's original four programs to the plan's projected accomplishments to determine which objectives had been met and which had not. Specifically, we found that the:

--Capacity Upgrade Program (CUP) had substantially achieved the plan's main objectives, but one key task has not been completed;

--Data Base Integration Program (DBI) achieved its main objectives; however, tasks related to objectives in the plan's state-of-the-art phase are behind schedule;

--Data Communications Utility Program achieved most of its objectives; however, key projects that support the state-of-the-art phase are behind schedule; and

--Software Engineering Program (SEP), considered to be the plan's major program, has not met its objectives; several tasks are far behind schedule; certain tasks, primarily supporting the state-of-the-art phase, have made limited progress. In addition, SSA has adopted an inherently risky strategy for its software improvement project, which deviates significantly from the SMP's original strategy.

SSA had added two programs to the original plan--the Administrative Management Information and Engineering (AMIE) and the System Operation Management (SOMP). However, we did not evaluate these programs in detail because they were not part of the original four programs in the 1982 SMP. We did consider them to the extent that they had impact on the original four programs.

We believe that the schedule slippage and changes in strategies in certain programs have potentially serious consequences for the plan's overall success and ultimately may reduce SSA's ability to effectively serve the public. These concerns are discussed briefly in this chapter. Chapter 3 focuses on our concerns about the plan's major program--software engineering.

MODERNIZATION PLAN COSTS

SSA originally projected the SMP costs at about $500 million for a 5-year period through March 1987. SSA's January 1985 SMP update estimates a total cost of about $863 million through September 1989. New programs represent a considerable addition to the plan's funding requirements.

In 1984, the Acting Commissioner's 5-year SSA plan cited the production of a reliable management information system as one of SSA's eight specific objectives, adding AMIE to the SMP. It is an extremely large program with budgeted costs in January 1985 of about $322 million through September 1989. SOMP was added in 1983 to modernize the operating environment related to the computer facilities; its estimated costs through September 1989 are about $23 million.

CAPACITY UPGRADE PROGRAM HAS SUBSTANTIALLY MET ITS OBJECTIVES

The Capacity Upgrade Program has made substantial progress, except for one key task, towards achieving its objectives for the survival and transition phases. These objectives were to

--eliminate backlogs and meet workload requirements (survival phase) and

--expand capacity and reconfigure the hardware (transition phase).

Increased capacity has reduced backlogs

SSA met capacity upgrade program objectives by acquiring new computers and consolidating its computer complex. SSA has replaced the eight computer processors it had with four modern processors and associated devices, which SSA stated have tripled overall capacity for meeting workload requirements and have provided for intermediate-range workload growth. According to SSA computer operations officials, this hardware improvement enabled SSA to eliminate its most crucial backlogs, such as the processing of annual-wage reports; the newer, more advanced hardware has fewer maintenance requirements and failures. SSA also replaced some of the computers supporting the administrative and management information workloads; this was completed in 1983.

SSA also reconfigured--consolidating, converting, and replacing computer components--its hardware consistent with its 1982 schedule. This consolidation helped meet SSA's workload requirements by increasing throughput and decreasing response

time. For example, according to SSA, a major process that used to take 23 hours to complete with its files on tape can now be accomplished in 5 hours.

Program service center computer procurement was deferred

One of the Capacity Upgrade Program's projects has not been performed. During the transition phase, a key task was to acquire and replace the program service centers'[1] computers. These computers were to provide more reliability and increase capacity. This project was not performed because SSA decided, after reviewing overall service center requirements, that a full software redesign was necessary. SSA delayed the hardware procurements to await software specifications being developed under the Software Engineering Program.

DATA BASE INTEGRATION PROGRAM MET MAIN OBJECTIVES

The Data Base Integration Program met its main SMP objectives for the survival and transition phases. They were to

--improve tape operations and implement direct access storage (survival phase) and

--convert major files to direct access and implement mass storage (transition phase).

However, the program also contains tasks that are to support the state-of-the-art phase. Accomplishing these tasks is not essential to meeting the survival- and transition-phase objectives, but they are important to the success of the next phase. We found that several of these tasks are not on schedule.

Transition- and survival-phase objectives were achieved

The Data Base Integration program transformed SSA from a massive and labor-intensive, magnetic tape-oriented system to a more efficient, faster, and less error-prone system using direct access storage technology. This program's major accomplishments included converting files to higher density tape and to disk storage. SSA converted to higher density tape storage (6250 bpi),[2] and reduced the number of tapes it was required to handle

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[1]SSA has seven centers nationwide that maintain claims folders, process claims exceptions, certify benefit payments, and print the mail notices to beneficiaries.

[2]bpi means bytes per inch and measures how many characters can be recorded on an inch of tape.

and control. SSA acquired more than 280 billion bytes[3] of direct access storage devices to permit converting the majority of its major files from tape to disk. SSA converted most of its major files from tape to disk on schedule. This conversion decreased processing time, reduced the labor spent on handling tapes, and gave field offices faster access to information. Although the acquisition of new hardware was primarily responsible for the program's achievements, results of the Data Base Integration program were also supported by software development efforts. For example, data access software was developed to better use the disks. This software, called MADAM,[4] is a transitional step that will be used until a full Data Base Management System is implemented.

Tasks supporting the state-of-the-art phase are behind schedule

Developing a data base architecture[5] and improving data quality and control are two tasks that are behind the 1982 SMP schedule. These two tasks are technically complex and are critical for SSA to achieve the state-of-the-art technology. Success of these tasks would provide one of the most important parts of the foundation for the entire systems modernization effort.

In general the concept, when implemented, would establish an integrated online data base facility. Then information about beneficiaries could be stored in a nonredundant manner and could be accessed and processed easily, quickly, and under uniform quality control. Designing the data base architecture and selecting a software package that will perform the data base management functions required by the architecture have not been done. SSA recently issued an RFP for design of the new data base architecture. However, the industry found it to be overly ambitious. A number of firms refused to bid, indicating the concept was beyond the state of the art. We discuss this issue in more detail in chapter 3. SSA has withdrawn the RFP; an SSA official advised us that another is expected to be issued soon.

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[3]This means the amount of storage needed to record 280 billion characters.

[4]Master Data Access Method--MADAM--was developed by SSA to provide online access to SSA files.

[5]Data base architecture refers to the concept SSA will use to manage its data base. The concept includes hardware considerations, but primarily emphasizes the system software structure and components.

SSA also has not completed several tasks aimed at answering data quality and control problems. According to the 1982 SMP, SSA would (1) implement and enforce all data standards and dictionaries for continued file maintenance and/or expansion, and (2) complete the activities of file validation to eliminate data redundancy, deficiencies, and errors by the end of the transition phase. SSA has developed a data dictionary necessary to control and standardize logical definitions of data elements. Although SSA developed and installed the framework for its data dictionary mechanism by March 1984, it was still recording ("loading") system information[6] into the dictionary at the end of the transition phase in March 1985. This means that the data dictionary is not being fully used in current processing operations. SSA does not expect to complete this step, which includes review of all data to eliminate errors and redundancies, until February 1987. SSA officials responsible for the Data Base Integration program attribute these delays to the lack of progress in determining software salvageability (the extent to which existing software can be modified for use in the new system) and software requirements.

DATA COMMUNICATIONS UTILITY PROGRAM MET MOST OF ITS OBJECTIVES

The Data Communications Utility program has met most of its objectives in the survival and transition phases. They were to

--eliminate daily return message backlogs and increase system availability (survival phase) and

--meet service-level requirements and install local office applications (transition phase).

An important procurement effort essential to the state-of-the art phase is behind schedule.

The purpose of the Data Communications Utility program was to re-engineer the SSA Data Acquisition and Response System for the transmission of data between and among the processing points within the SSA network.

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[6]After a data dictionary is developed and installed, information about actual programmatic data elements must be recorded in it. For example, the data element information about a person's last name would include the spelling of the data element name (e.g., LAST-NAME), its storage requirement (e.g., 20 characters), and the identities of the computer programs and files in which it is used and stored.

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Most transition- and survival-phase objectives were achieved

The Data Communications Utility program upgraded its communication lines and replaced its communication computers and terminals. In addition, SSA completed its new communication systems design.

SSA replaced its two IBM 370/168 computers with two National Advanced Systems (NAS 9060) computers, which increased the processing capacity. In addition, line speeds were increased and higher speed terminals (Paradyne 8400) were installed. According to responsible SSA officials, these activities eliminated message backlogs, improved response time, and significantly reduced processing downtime. This allowed service-level requirements to be met. Although the Paradyne terminals have improved processing, we previously reported[7] that these terminals did not begin to meet contractual performance requirements on a consistent basis until 2 years after contract award.

In 1984, SSA completed the general design for the optimum Data Communications Utility, which will eventually replace SSA's Data Acquisition and Response System. When implemented in SSA's offices, the Data Communications Utility will provide both interactive and batch processing of work from anywhere in the network, 24 hours a day, 7 days a week.

The transition-phase objective to install local office applications has not been achieved. SSA decided not to install local office applications; rather, it accelerated the implementation of the Data Communications Utility task that would, among other things, accomplish the capabilities of local office applications. However, as we discuss in the next section, the Data Communications Utility task is behind schedule.

A procurement that supports a state-of-the-art objective is behind schedule

Although SSA decided to accelerate the implementation of the optimum Data Communications Utility, a major procurement required for implementation is behind schedule. This acquisition is essential to meeting the state-of-the-art-phase objectives. In November 1984, SSA released an RFP to acquire communications processors for the Data Communications Utility. However, a vendor protest that SSA was overly restrictive in its requirements for the

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[7]Additional Information on the Social Security Administration's Management of Data Communications Contracts with the Paradyne Corporation (GAO/IMTEC-84-23, Aug. 27, 1984).

processors caused SSA to cancel the proposal. SSA is revising the proposal and plans to reissue it in late October 1985.

The proposal's cancellation has affected SSA's entire Data Communications Utility procurement program and implementation, including several major software initiatives. The major impact will be on the nationwide implementation of the Claims Modernization Project. This project will redesign SSA's batch-oriented claims payment system. Previous schedules provided for nationwide installation of terminals needed to support the modernized claims system in March 1986. However, because of problems in initiating the procurements, terminal installation has been delayed by at least 7 months and perhaps a year. This delay could also affect the systems modernization effort. The Data Communications Utility is as important as the Data Base Integration Program because both are needed for developing the new systems.

SOFTWARE ENGINEERING PROGRAM DID NOT MEET ITS MAIN OBJECTIVES

The software engineering program has not achieved the main objective of its survival and transition phases; however, some tasks associated with these objectives were completed. In addition, SSA has made progress in initiating software redesign systems that are essential for accomplishing the state of the art. The objectives of the survival and transition phases related to the software engineering program were to

--establish software engineering technology and initiate process redesign (survival phase) and

--improve existing software and complete detailed redesign specifications (transition phase).

Under the original 1982 SMP, these objectives were to be completed in sequence. First, SSA was to establish a software engineering technology, and second, improve its existing software. After these activities were complete, SSA was to implement the redesign of its software systems. We believe the original plan and its sequence of events represented a reasonable approach. SSA, however, did not completely follow this approach, adopting an inherently risky strategy.

Software engineering technology is incomplete

Development of the software engineering technology is significantly behind schedule. Originally SSA planned to complete the software engineering technology in March 1983; it now estimates a July 1986 completion date. Its goal was to implement software engineering methodologies within SSA and to establish an adequate

environment for software activities. These activities would include establishment of software standards, procedures, and quality-control mechanisms needed to salvage existing program codes and develop new software programs. SSA developed an initial software engineering technology manual; however, it did not contain certain pertinent information and lacked the necessary provisions for quality assurance and compliance.

Software improvement is behind schedule

The major goals of the software improvement tasks were to position SSA to take advantage of new technology, to improve the maintenance and portability of existing software, and to create a foundation upon which to build the new software system. Many software improvement tasks originally scheduled for completion by 1985 are now set for completion between 1986 and 1989. For example, conversion of programs from Assembler Language Code to Common Business Oriented Language was originally expected to be completed by March 1985. Now, SSA estimates that it cannot identify the programs to be converted until January 1988 and plans conversion for no earlier than October 1989.

Another task called for the development of tools to identify and eliminate dead code[8] in the computer programs by March 1984. SSA has not performed this effort and does not expect it to be completed until 1986.

Further, a software improvement task of documenting the existing systems scheduled to be completed by March 1984 is significantly behind schedule.[9] This documentation would make the software easier to change and could build a strong foundation for designing and building its new software system.

One reason SSA gives for not accomplishing many of the software improvement tasks is that an analysis indicated that much less of the existing software code could be used in the new software system than was originally estimated. By not improving the existing software as planned, SSA has made a major change in its original approach to the software engineering program. As we discuss in chapter 3, this has certain inherent risks.

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[8]Dead code means program statements never executed because of flawed program logic.

[9]In our report, Social Security Administration's Progress in Modernizing Its Computer Operations (GAO/IMTEC-85-15, Aug. 30, 1985), we concluded that absence of adequate documentation seriously affected SSA's ability to respond to legislative changes.

Certain tasks were completed

SSA has made improvements to the enumeration system (which processes requests for Social Security numbers) by implementing new programmatic software. These software improvements yielded significant time and labor savings and, according to SSA, contributed to faster public service.

SSA has also made initial strides in the development of a new software system design by conducting a top-down analysis of its business processes and programmatic requirements. SSA performed this analysis by dividing the computers' systems into logical application groups, in which subsystems that perform similar functions are grouped together. The 1982 SMP specified that a software system architecture study would be performed after logical application groups were defined. This study was to have examined alternative system configurations, considering trade-offs such as manual versus automated procedures and centralized versus distributed processing. SSA has not completed the study and a system architecture has not been defined. A defined software system architecture provides direction for system development.

From the top-down analysis, SSA was also supposed to analyze the software systems' user requirements and develop program specifications for missing functions or functions that needed to be replaced. Such an analysis gave a good, general description of the ADP functions, but it did not specify new functions to be changed or replaced and was not sufficiently detailed to support the software redesign effort.

Some progress on tasks essential for the state-of-the-art phase

Although the objectives of the first two phases have not been achieved, SSA has initiated some major software redesign projects. For example, SSA initiated the Claims Modernization Project in April 1983. This project will eventually redesign the batch-oriented claims system to provide interactive operations and expanded automated control and audit functions. SSA estimates the project's completion in 1988. SSA has completed some tasks under the Claims Modernization Project. For example, it has established model facilities to test and evaluate the new claims modernization procedures. SSA is also using the York, Pennsylvania, and Baltimore, Maryland, District Offices as pilots. SSA officials indicated that the main benefits of the Claims Modernization Project thus far have been readily accessible data, immediate editing capabilities, and paperwork reduction. These benefits are primarily attributed to the additional terminals and the fact that data are now recorded on disks, which are faster than the tapes formerly used. Even though some software has been developed, it is

for entering and editing claims information. The existing claims processing software, which computes the benefit amount, has not been improved; it is still a batch-oriented system.

SSA also is designing a new debt-management system to control the collection of approximately $370 million in overpayments to beneficiaries. This new system, scheduled for implementation in 1986, should provide better control over delinquent accounts and maintain strict accountability over all collections.

CHAPTER 3

THE SOFTWARE ENGINEERING PROGRAM IS BEHIND SCHEDULE AND CONCERNS EXIST ABOUT ITS APPROACH

As the Committee requested, we examined the adequacy of SSA's proposed plan to upgrade its software (the Software Engineering Program) and whether that plan is on schedule. Specifically, we found the following:

--SSA's initial plan for upgrading its software called for a careful and sequenced approach to system redesign. However, SSA has deviated from this approach and has not completed the critical software tasks needed for a proper foundation to redesign its software systems. This approach is risky because it does not provide SSA the ability to document existing systems' requirements or to validate the effect that new requirements and state-of-the-art technology will have on the newly redesigned systems. This situation raises concerns about SSA's ability to effectively redesign its software systems. This could affect SSA's ability to successfully complete the SMP and ultimately may reduce the effectiveness with which SSA performs its mission.

--The software upgrade plan is behind schedule in comparison to both the initial plan and the revised SMP schedules. The lack of software progress in two critical areas--Software Engineering Technology and Software Improvement--has already caused SSA difficulties in redesigning certain software systems.

These conditions have been caused by several factors, including inadequate management attention, constraints of staff resources, and multiple organizational changes. Further, SSA underestimated the complexity of software tasks and did not perform an in-depth analysis of its existing software to determine the extent to which it could be used in the new system, i.e., how much could be salvaged.

We also found that the Data Base Integration program deviated from original SMP approaches because SSA currently plans to build a data base that appears to be beyond the state of the art. The original plan called for a state-of-the-art data base environment. We believe that its current data base architecture concept is a research-and-development project and that such an approach will hinder SSA's successful completion of the SMP.

On September 6, 1985, SSA briefed us on the SMP's current intentions. SSA's Deputy Commissioner for Systems indicated that

plans have been "revamped" in a direction that appears to represent the initial approach as described in the 1982 SMP. SSA systems officials indicated that they have developed a strategy to put priority on the systems engineering environment (SSA's 1982 SMP survival-phase objective of developing a Software Engineering Technology) and on software improvement projects (SSA's 1982 SMP transition-phase objective). This chapter describes software redesign efforts up to this most recent change in strategy.

INITIAL SOFTWARE PLAN APPEARED APPROPRIATE

Inadequate software was identified as a major underlying factor for SSA's systems problems. Software upgrade, therefore, was given special emphasis in the SMP as the major thrust of the corrective action plan. It emphasized a gradual series of steps toward a new state-of-the-art system to be accomplished by first improving its existing systems. This was to be realized by performing the Software Engineering Program's survival and transition objectives, which were to

--establish and use a new Software Engineering Technology and

--establish and execute a Software Improvement Program.

SSA summarized its rationale for this approach in the 1982 SMP:

> "To replace all software would be extremely risky, require maximum reinvestment of resources, and require more time than SSA has to survive the current crisis. To achieve software technology improvement within the current hardware architecture, as required by the governing strategy, will require the development of modern, automated tools and standard procedures....the key element of this incremental evolutionary software approach is the recovery of SSA's heavy investment in software, and the immediate benefit of new investment in software improvement."

In our 1982 report[1] we generally agreed with the Software Engineering Program approach. We believed, however, that SSA had underestimated the magnitude and complexity of the software effort. In addition, we found that SSA had not performed any in-depth study of its existing system to determine what software improvements were needed.

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[1]Examination of the Social Security Administration's Systems Modernization Plan (GAO/HRD-82-83, May 28, 1982).

SHIFT IN THE SOFTWARE UPGRADE APPROACH AND INADEQUATE SOFTWARE PROGRESS MAY INCREASE THE RISK OF ACCOMPLISHING SYSTEM REDESIGN

SSA has not followed its initial plan for upgrading its software systems. Instead of following its original plan to first, develop a Software Engineering Technology, second, to improve its existing software and third, to redesign its systems, SSA is redesigning its systems before completing the initial two steps. Several reasons caused SSA's shift in approach and the slow progress in the upgrade effort. Complexity of existing software and inadequate documentation caused early attempts at improvement to be unsuccessful. SSA officials also stated that an analysis of its proposed system functions determined that much of the existing software was not salvageable and thus software improvement should be limited to only salvageable software. Further, inadequate management attention, staffing constraints, and organizational changes have also affected the program's progress.

We believe SSA's approach to system redesign is inherently risky because it does not lay the necessary foundation for effective systems redesign. Even if the existing software cannot be salvaged for use in the new system, a fundamental step essential to any redesign effort is to first document the existing systems' requirements. SSA's current approach does not call for such documentation. In addition, because SSA performed limited software improvements, it must continue to use its admittedly inadequate software for a lengthy period--until the new software is designed and put into use.

Difficulties in accomplishing Software Engineering Technology project adversely affect SMP

The SMP recognized the need for a standard approach to develop and maintain software. Programmers have many options for designing, coding, testing, and documenting computer programs. Without standard methods, the use of which is enforced, (1) labor costs to maintain existing systems are higher (because programmers who did not write the programs they are maintaining must spend extra effort to understand them), and (2) it is more difficult to measure and control software development. The SMP called for a Software Engineering Technology project to avoid the types of problems mentioned above. This project's two major tasks were to

--develop the manual containing software standards to formalize the most productive and efficient programming methods and

--establish a quality-control mechanism to ensure that new software adhered to established standards and practices.

Standards in the Software Engineering Technology manual were insufficient

Although SSA developed a Software Engineering Technology manual that includes standard techniques and methods for managing, developing, and maintaining computer systems, it is incomplete, thus reducing its usefulness. Some of the deficiencies of the manual include inadequate documentation standards for software development and specification tracing.[2] SSA officials responsible for developing and using the manual indicated that it is incomplete. They attributed the problem to inadequate staffing and management attention.

Software development documentation consists of many different types of documentation; examples are functional requirements and system specifications. The manual does indicate the type of documentation required; however, it gives neither examples nor a clear understanding of what the documentation should contain. Documentation is necessary to adequately maintain a software program. This lack of detailed guidance hindered SSA's ability to document the Claims Modernization Project system specifications. For example, SSA requested the systems engineering and integration contractor to develop the claims project system specifications. Because the manual's standards were unclear, the contractor had difficulty determining the type of documentation SSA was requiring; consequently, it performed unnecessary documentation efforts.

Another deficiency in the Software Engineering Technology manual is that it does not adequately explain how specification tracing is to be documented. Such guidance is needed so system changes can be effectively traced. Without appropriate documentation procedures, SSA will have to continue to depend on programmers' intimate knowledge of its systems. This is not a good situation because when persons leave the agency or are otherwise unavailable, there is no backup source of information to answer questions about the software programs, and errors may not be corrected easily. In January 1985, the HHS Office of Inspector General reported inadequacies in standards for specification tracing, noting that these standards were critical to improving SSA's ability to make program changes.[3]

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[2]Specification tracing is the process of tracing through the design of a system from the details of user requirements to the computer program code that carries out those requirement details.

[3]HHS Office of Inspector General, SSA's Redesign of the Claims Processing System Under the Systems Modernization Plan (Jan. 30, 1985, Audit Control Number 15-52654).

On March 11, 1985, the Deputy Assistant Administrator for Central Information Service, General Services Administration, gave his evaluation of the SMP. Specifically, on SSA's Software Engineering Technology he commented:

> "It is in the area of creating a proper software engineering environment that SSA falls down badly. Without this, it is very difficult to undertake major re-developments or expect gains in maintainability.... This lack of standardization and lack of a uniform system engineering methodology pervades all software activities and limits any hoped-for major gains."

SSA did not establish a quality-assurance mechanism

The 1982 SMP specified that a quality-assurance mechanism would be implemented to ensure that the standards established in the Software Engineering Technology manual were followed. However, a quality-assurance mechanism has not been established. Such a mechanism is needed to ensure that Software Engineering Technology standards are being consistently complied with and are adequately understood.

Even though SSA has officially published a Software Engineering Technology manual, the degree of compliance with it and of its effectiveness are difficult to determine. For example, the manual contains procedures for program change control[4] and for use of programmer tools;[5] however, because there is no quality-control mechanism (no one checking to see if the procedures are performed), agency officials do not know if the published procedures are being followed.

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[4]Specific, orderly actions to control program changes, including their authorization, testing, justification, anticipated effects, transition to production use, and followup (to ensure their implementation). If uniform procedures are not published and practiced, no audit trail exists and vulnerability to error and fraud increases, as do labor costs and staff time.

[5]Programmer tools help reduce the labor costs and time required to develop, change, test, and document computer programs. If uniform procedures for their use are not published and adhered to, project completion will be less predictable and potential labor and time savings will not be realized.

Adverse effects of incomplete Software Engineering Technology project

The tasks to be accomplished as part of the Software Engineering Technology project were important to SSA's redesign projects. Because of the deficiencies we noted in the software manual, certain redesign projects experienced difficulties. For example, the systems engineering and integration contractor, in an August 1984 document, described the problem emanating from the inadequacies of SSA's Software Engineering Technology manual, specifically the lack of a detailed system development methodology. The contractor stated that this caused overlap in scope among seven ongoing system development projects it had reviewed. Further, it indicated that its system redesign efforts were hindered by the lack of this methodology. In June 1985, the contractor reported it was still having difficulties redesigning SSA's claims processing system because of the inconsistent and inadequate documentation that was developed for a related software project--Claims Modernization. Also, Health and Human Services' (HHS') Office of Inspector General reported in January 1985 that the Claims Modernization Project was initiated before system development standards were incorporated into the manual. Thus, redesign efforts were undertaken without the necessary standards for developers to use.[6]

Reasons why problems occurred

Effective implementation of the software technology task has suffered from multiple organizational moves and insufficient staff. The organizational location of the Software Engineering Technology project has changed three times since it was established in 1982. And there have been five different project leaders assigned to this effort. These changes in management contributed to the project's delays and its redirection. For example, although a project plan to develop the Software Engineering Technology, including pertinent tasks and timeframes, was prepared in 1984, it was revised and not approved until July 1985 because of the changing management. In addition, despite the complexity and importance of the Software Engineering Technology project, no more than three full-time staff at any one time were assigned to it. SSA officials recently indicated that they plan to place more emphasis on developing the Software Engineering Technology manual.

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[6]Social Security Administration's Redesign of the Claims Processing System Under the Systems Modernization Plan (SMP) (HHS-OIG-15-52654, Jan. 30, 1985).

Software improvement tasks are behind schedule

The second objective of the software upgrade program, which was to be done after the Software Engineering Technology was established, was the software improvement program. The software improvement program was needed for the following reasons:

--Documenting existing systems would (1) develop a description of what the systems actually did for users that would aid decisions about the new system (in some cases, this description was missing completely), and (2) reduce the labor cost of maintaining the existing systems by making them easier for programmers to understand and less vulnerable to employee turnover.

--Improving existing software would (1) make it easier to adapt to new user needs, (2) reduce the labor cost of maintenance, (3) render some of the software more useable as components of the new system, and (4) reduce the machine costs of operating the software.

Software improvement activities, however, have not taken place as scheduled in the 1982 SMP because of planning and management problems. Furthermore, SSA had de-emphasized the software improvement approach in favor of system redesign efforts based, in part, on a limited analysis that indicated that much of the existing software should not be salvaged for use in the future system. Thus, the condition of its existing software has not materially changed since 1982 and basic problems remain. SSA, however, will continue to operate with its existing inadequate software until replacement software is available. SSA may have to use existing software well into the 1990s. Moreover, not performing improvements of the existing software, such as documentation, may increase the risks of the entire redesign's being unsuccessful.

Initial software improvement efforts were unsuccessful

Several of the initial software improvement efforts were unsuccessful due to poor planning, unrealistic timeframes, and insufficient documentation of the existing software.

In 1983, SSA entered into contracts intended to improve the CAPS,[7] MADCAP,[8] and EARNINGS[9] systems. The CAPS and MADCAP contractors were to improve the software by upgrading the language, standardizing the data element names, and eliminating unused functions. The EARNINGS contractor was mainly to convert the software code to a higher level language.

The HHS Office of Inspector General reviewed[10] the three contracts and noted that (1) the statements of work for the contracts did not clarify expectations, (2) there was a perceived urgency to initiate some visible progress in upgrading software, leading to inadequate planning; and (3) CAPS and MADCAP systems were unlikely candidates for improvement by contractors because they were large, complex, and poorly documented.

The report further noted that SSA spent about $1.1 million on the three contracts, though none of the software products was useable as delivered. Only a third of CAPS "improved" software code was useable after SSA staff reworked it, and none of MADCAP's improved code was useable. The computer programs from the EARNINGS system were delivered in an incomplete and inaccurate form. However, they were eventually corrected by SSA staff after expending time and resources.

The report stated that causes of these problems included (1) vague statements of the work to be done, (2) inadequate planning by SSA's Office of Systems, (3) SSA's lack of experience in software contracting, (4) inadequate documentation, and (5) selection of a contractor unfamiliar with the systems.

The effects of these contract problems were (1) wasted money, (2) delayed improvements, and (3) unexpected rework by SSA's employees. In addition to the unsuccessful initiatives noted above, other tasks in the software improvement program have

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[7]CAPS (Claims Automated Payment System) is an automated system that processes certain types of claims transactions of SSA beneficiaries, principally initial claims such as beneficiary status determinations.

[8]MADCAP (Manual Adjustments Credits and Awards Process) is concerned with claims that require first manual, then automated processing.

[9]The EARNINGS system records wage earners' earnings.

[10]HHS Office of Inspector General Report, SSA Needs to Redirect Its Software Improvement Efforts (June 13, 1985, Audit Control Number 15-52662).

progressed slowly. This is due, in part, to SSA's decision not to salvage the existing software, as discussed below.

Software improvement strategy was changed

The original approach toward software improvement was to document existing systems before designing and building new ones. This approach would make it easier to change the existing software and would provide a strong foundation for the new software systems. However, because of the difficulties experienced in the initial software improvement contracts and because a study showed that much less code could be salvaged than originally expected, SSA changed its approach. The new approach is an inherently risky one that calls for new systems to be designed before completion of important software improvement tasks, such as documentation, elimination of dead codes, and code conversion to a more modern computer language.

SSA's study of salvageable software compared its existing systems against functional requirements identified in a high-level review[11] and determined that virtually none of the existing software was "good," 38 percent could be re-used or "salvaged" in the new system with modifications, and about 62 percent could not be re-used. However, the study also indicated that final decisions on salvageability could not be made until more detailed application requirements were specified by evaluating existing systems at the detail level of computer programs and files. Further, some key program officials stated that an accurate determination could not occur until functional requirements for the programmatic applications were completed. The first of these is not due until December 1985.

Even though SSA has experienced difficulties in software improvement efforts and a limited study has shown that much of the existing software may not be salvageable, it does not seem prudent, in our opinion, to make such a major and potentially risky change in strategy until sufficient information is available upon which to evaluate salvageability. Further, we believe many of the improvement tasks that may be abandoned with the shift in emphasis are needed even if a total system redesign is required.

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[11] Functional requirements specify what automated systems are to do for users but do not specify how the work will be done. High level means a brief overview without much detail. For example, a very high-level functional requirement for a payroll system would be to pay 5,500 employees every 2 weeks year-round in a manner complying with relevant laws.

SSA's DATA BASE PLANS DEPEND ON UNPROVEN SOFTWARE TECHNOLOGY

Development of a data base architecture is a major task under the SMP's data base integration program, and is critical to achieving a state-of-the-art system. SSA has developed a data base architecture concept. Based on this concept, SSA issued a data base RFP for the design, development, and implementation of a new data base architecture (i.e., creating new data base software). We found that the private sector generally responded negatively to the RFP. We examined both the RFP and comments that SSA subsequently requested from prospective contractors and discovered that (1) SSA's plans included software that was beyond the state of the art and (2) three vendors indicated that SSA's desires amounted to a research-and-development project with a high risk of failure--not "state of the art" but beyond it.[12]

We also requested a consultant's review of the RFP and the vendors' comments. He (1) concurred with the vendors' comments; (2) estimated that the job would require a minimum of 5 to 6 calendar years' time and about 500 staff years of labor, some of it necessarily very skilled (the t. e includes 2 to 3 years' parallel operation with the existing system); (3) thought SSA should either change its approach to that of partitioning the data base or to that of announcing the present concept as research and development, in hopes that it would succeed; (4) considered that very few U.S. companies could fill the request as issued; and (5) thought that a mixed in-house/contract-labor approach would not be prudent.

We discussed the RFP with the data base integration manager, who acknowledged some risk in SSA's approach and SSA's intent to subdivide the RFP and accomplish some of the work in-house. He stated that the revised RFP would be issued in the near future.

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[12]SSA issued the Data Base Architecture RFP on March 7, 1985, and received five responses. Judging all of the responses technically unacceptable, the agency cancelled the RFP on May 20. A responding bidder protested the RFP's cancellation to GAO on August 9, 1985. This protest is currently under consideration.

CHAPTER 4

RECURRING MANAGEMENT ISSUES STILL ADVERSELY AFFECT MODERNIZATION PLAN PROGRESS

The Chairman, in his letter, and his staff, in subsequent discussions, also asked us to determine whether (1) SSA has made strides to correct general management problems that have plagued its computer operations, and (2) SSA has taken the necessary management actions to improve its ADP personnel situation. Specifically, we found that SSA continues to have problems in

--effectively planning, managing, and controlling its computer operations and

--adequately staffing its computer operations.

These problems have contributed significantly to the difficulties SSA has had in implementing various aspects of the SMP.

SSA's PAST MANAGEMENT PROBLEMS

In addition to SSA's citing general management problems in the 1982 plan (e.g., inadequate management attention and changing priorities, staffing deficiencies, and ineffective planning and control processes), several of our reports over the past years also document these problems.

As we previously reported,[1] SSA has inadequately planned and managed past redesign efforts, causing delays and major system errors. For example, SSA took shortcuts in developing the Supplemental Security Income computerized system, which contributed to $1 billion in erroneous benefit payments over a 2-year period. In addition, problems SSA experienced in modifying the Retirement, Survivors, and Disability Insurance automated system in late 1981 resulted in more than 10,000 student beneficiaries' receiving late checks because their payments were erroneously suspended. These errors were due to mismanagement of extremely complex and large redesign projects.

Further, in our reports[2] on SSA's contracts with the Paradyne Corporation, we warned SSA of management deficiencies related to

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[1]Social Security Needs To Better Plan, Develop, and Implement Its Major ADP Systems Redesign Projects (GAO/HRD-81-47, Feb. 6, 1981).

[2]Social Security Administration's Data Communications Contracts with Paradyne Corporation Demonstrate the Need for Improved Management Controls (GAO/IMTEC-84-15, July 9, 1984) and Additional Information on the Social Security Administration's Management of Data Communications Contracts with Paradyne Corporation (GAO/IMTEC-84-23, Aug. 27, 1984).

its hardware and software procurements. We cited significant deficiencies in SSA's management of all major phases of its terminal-replacement contract. For example, we reported that SSA acquired a data communications system that did not begin to consistently meet contractual performance requirements until nearly 2 years after the first terminals were installed.

SSA's PROBLEMS IN EFFECTIVELY PLANNING, MANAGING, AND CONTROLLING COMPUTER OPERATIONS CONTINUE

SSA recognized in the 1982 SMP that past efforts to modernize the ADP system have failed due to long-standing planning and management weaknesses. To avoid such problems with the SMP, SSA established an approach to obtain a systems engineering and integration (SE&I) contractor who would assist SSA in planning, managing, and giving continuity to implementing the SMP throughout its life-cycle. Further, SSA also recognized the extreme complexity of the SMP and requested that the SE&I contractor develop an automated management-control system. This control mechanism was deemed essential for monitoring about 200 SMP and related projects and their interdependencies.

However, the SE&I contractor was not used as intended and certain products, though accepted by SSA, were only partially used. Consequently, SSA has not been able to achieve effective coordination and management control over the SMP. As a result, this has hindered SMP's progress, economy, and efficiency. We also noted the SE&I contract costs have increased significantly over original estimates. SSA officials acknowledge that integration objectives have not been met because of staffing shortages, requiring the contractor's services to be used in other areas. In a September 1985 meeting with SSA's Deputy Commissioner for Systems and his staff, we were told that they plan to strengthen the integration functions by requesting the SE&I contractor to perform specific integration tasks.

SSA's use and monitoring of the integration contractor hindered SMP progress

The SE&I contractor was supposed to be responsible for supporting SSA management in planning, controlling, and evaluating the modernization process, and for providing technical resources through its own organization or through SSA-approved subcontractors. To avoid potential conflicts of interest, the SE&I contractor was to be precluded from working on software beyond its role in management support of SSA and technical guidance for the overall design of system components.

Even though SSA recognized that the SE&I contract would be a key element to the SMP's success, SSA

--did not award the contract until 9 months after the SMP began, adversely affecting the plan's progress;

--ineffectively monitored the contract after the award, directing the SE&I contractor to perform detailed software tasks (contrary to the intent of the 1982 SMP and the original SE&I contract) rather than the integration role intended; and

--reviewed and accepted some SE&I deliverables[3] that were not used effectively.

The SE&I contract was awarded after the SMP was initiated and its costs have increased. Further ineffective management and monitoring of the SE&I contract have adversely affected the SMP progress.

Delay in awarding SE&I contract slowed SMP startup

We stated in our 1982 report[4] that SSA's SMP implementation officially began on March 2, 1982, but an SE&I contractor had not yet been hired. We commented that delays in hiring an integration contractor as a single point of support for the SMP would cause substantial delays in the SMP's implementation.

SSA released a Systems Engineering and Integration RFP on July 30, 1982. SSA awarded the SE&I contract on December 8, 1982--a full 9 months, or half-way, through SMP's survival phase.[5] Because the contract award was delayed and SSA was well into its survival phase, SSA directed the SE&I contractor to accelerate its work. Its purpose was to create a schedule synchronized with the SMP phases--survival, transition, and state of the art. That meant that the original contract had scope-of-work dates extensively modified by SSA to accelerate some of the activities. SSA required the SE&I contractor to complete 43 deliverables by September 1983 (end of the survival phase). The original statement of work did not request these deliverables until June 1984, a factor that contributed to increasing the contract's costs by about $3.5 million.

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[3]In SSA's SE&I contract a deliverable is a specific task or group of tasks the contractor is required to complete within a specified time.

[4]Examination of the Social Security Administration's Systems Modernization Plan (GAO/HRD-82-83, May 28, 1982).

[5]This report deals with only post-contract award issues. We are reviewing this contract award under a separate audit.

Integration contractor not used as intended

SSA's justification for a prime contractor was the need to integrate the complex systems modernization plan. Although SSA requested integration plans in the RFP, only general integration tasks were defined in its first two statements of work in the contract. The SE&I contractor indicated it had no significant involvement in integration work during the period (December 1982-September 1983 and October 1983-September 1984) covered by the first two statements of work. During this timeframe SSA directed the SE&I contractor to perform detailed software tasks, even though these types of tasks were not intended by the original contract. For example, this contractor was directed to work with the functional systems and program specifications for the Claims Modernization Project. However, SSA did subsequently amend the contract to allow the contractor to perform certain software tasks.

SSA did write integration tasks into the third primary statements of work corresponding to the October 1984 to September 1985 period. However, because the SE&I contractor was involved in the design of SMP tasks (such as the Data Communications Utility Program and the Claims Modernization Project), it was put in a position of having to identify major flaws or deficiencies in its own work. Because of this, SSA decided that its program managers would both develop the necessary tactical and project plans and do the integration for their respective areas. The program managers would then provide this information to the contractor, who would perform integration among SMP programs. Some high-level SSA officials, including the Government Project Officer for the SE&I contract, now believe that the SE&I contractor has been so positioned that it may no longer be able to approach its integration role with a completely unbiased perspective.

SSA also wanted a contractor to provide continuity because SSA's management turnover was high. However, the SE&I contractor's staff also has experienced frequent changes in management and staff. For example, its project management has changed four times within the contract's 3 years. A key SSA Office of Systems official indicated that the SE&I contractor has not provided desired continuity over the SMP.

SSA accepted but did not use SE&I contract deliverables

A significant deliverable--a master plan for the total SE&I role--costing about $100,000 was performed by the contractor and submitted to SSA during SMP's survival phase. SSA's Government Project Officer sent the contractor a qualified acceptance memo. It stated:

> "We have reviewed your recent submission of Item #3, Master Plan for SE&I Role. Though the document

broadly defines the role of the SE&I contractor, we find the draft plan as submitted would be very difficult to modify or update and therefore expire too quickly as a management tool. Even in its current form, parts have become out of date and therefore inaccurate, inconsistent with detailed work plans which have been developed since this draft master plan and we feel the time/cost to update the master plan serves no useful purpose at this point in time.

We provide qualified acceptance for this deliverable in its current form and ask that no more effort is spent on improving or updating it. As soon as possible detailed SE&I project plans will be implemented in the MMCS [Modernization Management and Control System] and at that point we will have a more useful management tool."

As we discuss below, the MMCS was not used effectively; consequently, little practical use was made of the project plans.

The 1982 SMP proposed to develop the MMCS automated system--a critical SMP management tool--consisting of SE&I deliverables. They were accepted by SSA but were not effectively used. MMCS was to integrate SMP functio of the SSA Systems Modernization Plan. It was intended to encompass the elements necessary for effective management, control, progress monitoring, and evaluation of SMP projects. The ba ic system was supposed to offer automation and graphics and was t be an integrated set of techniques, practices, and services for enhancing the effectiveness of program management decisionmaking, fo both near- and long-term project requirements.

The SE&I contractor's mission was to develop software under PAC II[6] to support project control, budge and contract tracking, and procurement management. These system were to provide up-to-date status on all SMP projects. Th contractor delivered the software required and the system was o. ational. SSA, however, stopped entering pertinent data in the system, which resulted in incomplete information and prohibi d effective monitoring of the SMP. SSA officials responsible for the SMP said they did not use the system because it was too labor-intensive; its use was discontinued in November 1984. SSA spent about $2.6 million for MMCS, including the PAC II system, which was not effectively used.

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[6]PAC II is a software package for project management.

SE&I contract costs still rising

SSA originally estimated in the 1982 SMP that by March 1985 the SE&I costs would be $6 million; however, actual expenditures by July 1985 were about $22 million and were projected by SSA to be almost $32 million by March 1987.

SSA submitted an Agency Procurement Request to HHS in July 1984 seeking additional SE&I services totalling $15 million for 3 years (1985-87). SSA stated that during the survival phase, contract funds were consumed more rapidly than planned because SSA

--could not draw on as much of its own staff for the SMP as was expected due to the increased responsibilities caused by new legislation and

--tried, but was unable to recruit technicians and managers having state-of-the-art skills, thereby placing greater demands on acquiring these skills from contractors.

ADP STAFFING RESOURCES HAVE IMPROVED, HOWEVER, DEFICIENCIES STILL EXIST

The 1982 SMP emphasized the importance of having sufficient, qualified staff to implement the plan effectively. SSA developed management initiatives to alleviate recruitment problems and to train its staff. SSA has performed considerable recruitment and training activities and has made some progress in improving the technical capabilities of its staff. However, agency officials indicate that SSA still lacks staff of sufficient quality to effectively implement the SMP. Responsible officials indicated that recruitment is hindered by federal policies, requirements, and pay scales. To further compound SSA's staffing problems, its executive and senior-level management positions, critical for the SMP, continue to change. In addition, since the 1982 SMP was published, SSA has replaced the Commissioner, Deputy Commissioner for Systems (both successors are acting), Government Project Officer for the SMP, and many other SMP managers. These changes adversely affect the SMP's continuity and hinder effective planning. Insufficient staff has contributed to SSA's not being able to complete the Software Engineering Technology project. Furthermore, lack of sufficient staff was also cited as a reason for using the SE&I contractor staff for detailed software projects instead of the overall integration and planning functions as originally intended.

SSA has progressed in training staff

In accordance with the SMP, SSA has initiated ADP training programs for its personnel. SSA contracted with the Department

of Agriculture Graduate School to develop and teach courses pertinent to the SMP's needs. The school's first task was to develop a comprehensive training-needs analysis. This was performed, and 12 systems courses were offered to over 600 SSA employees from January through September 1983. From October 1983 to December 1984, SSA offered 90 additional courses to provide baseline skills and techniques relevant to the SMP. We discussed the effectiveness of these courses with the trainees and their managers. For the most part, persons were satisfied with the courses and thought them pertinent to ongoing SMP efforts. However, the amount of training in the management areas seemed inadequate, particularly for procurement procedures and contracting courses, because they were given on an ad hoc basis. Initially no project management courses were offered; however, the first one was given in January 1985. SSA has recently developed ADP acquisition courses for 1986.

Staffing problems hinder SMP progress

Despite SSA's many management initiatives at recruitment, some SMP projects have been delayed because of insufficient staff. Activities include obtaining special recruiting authority, attending job fairs, and advertising extensively in various newspapers and technical journals. These efforts have helped SSA in hiring new employees. Since the SMP began, SSA has hired 267 staff to work with its computer systems, but it has lost 216 staff[7] in the same series and within the same timeframe (1982-84). SSA officials stated that it is having trouble filling high-level management positions with qualified candidates because federal salary rates are not competitive with those of private industry. They say that the salaries SSA can offer are inadequate to attract many highly trained, experienced ADP personnel. Our general review of information comparing federal and private-industry ADP salaries seems to support SSA's view. A comparison of Bureau of Labor Statistics salary information for federal employees with Office of Personnel Management information on private-sector salaries showed that federal salaries for entry-level ADP personnel (programmers/programmer analysts) were lower than private-sector rates for similar positions by 17 to 26 percent.

Despite recruitment constraints, SSA hired and trained 127 entry-level ADP systems staff in 1985. This helped the "quantity" of staff, but it did not solve the problem of staff skilled in

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[7]SSA's hires, losses, and turnover rates include computer specialists (federal classification series 334) positions only.

state-of-the-art technology. According to an SSA official, it takes 1.5 years to train a systems programmer in the basics of operating-system software; 4 additional years of training are needed before the programmer can contribute fully. This time lag, in his opinion, has hindered the progress of the operating-system software projects.

Other major SMP projects have been delayed or not performed, in part, because of staffing problems. For example, agency officials indicated that the Software Engineering Technology development was behind schedule partly because of staffing shortages. In 1982, SSA planned to develop the Software Engineering Technology with six separate teams of staff; however, only two teams were staffed. These were the software testing and development teams. Because the other teams were not implemented, the Software Engineering Technology manual lacks consistency and depth. Moreover, a tracking system (i.e., quality-control mechanism) for the Software Engineering Technology has not been staffed.

In addition, the Government Project Officer for the SMP contracts stated that he had insufficient staff to properly review and evaluate SE&I contractor deliverables between October 1984 and February 1985. As a result, several deliverables were deemed acceptable under a contractual clause allowing their acceptance if the agency fails to submit formal, written comments on the final deliverable within 30 days. The project office's review is critical to effectively monitor the SE&I contractor's efforts and is an important management control over the entire SMP.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

SSA's computerized systems had degenerated by the late 1970s to a point that the agency's ability to perform its mission was affected. By 1982, deficiencies were apparent in all aspects of SSA's computer operations--software, hardware, and personnel support. SSA depends heavily on computer systems to carry out its mission. This includes recording earnings for about 60 million wage earners and distributing benefit payments to the public that in fiscal year 1984 amounted to about $163 billion.

In 1982, SSA developed a systems modernization plan to correct the deficiencies in its computer operations. The plan called for an incremental approach to system modernization consisting of survival, transition, and state-of-the-art phases. The plan consisted of four major programs, each having objectives to be accomplished during the plan's three phases. These programs were the Software Engineering Program, the Data Base Integration Program, the Data Communications Utility Program, and the Capacity Upgrade Program. The plan focused on software as an important and integral part of the modernization effort. Its basic strategy was to integrate software and hardware improvements into a single plan. This integrated approach contrasted to SSA's practice during the 1970s of retaining inadequate software while attempting to solve its problems by purchasing hardware. While in the short run, the addition of hardware has allowed SSA to function, it did little to solve its long-term problem of inadequate software.

SSA has made some progress in implementing the 1982 SMP, however, the plan is not being fully implemented. The progress has mainly been in three of the plan's four programs--Capacity Upgrade, Data Base Integration, and Data Communications Utility. This progress primarily can be attributed to the acquisition of hardware. Although SSA has met important objectives for these three programs, some 1982 SMP tasks critical to the state-of-the-art phase are behind schedule:

--The Data Communications Utility Program task to procure equipment for a nationwide communications network is behind schedule, and may delay SSA from obtaining the state-of-the-art phase as planned. This is critical because the network is vital for successful implementation of a significant software project that initiates payments to beneficiaries. Consequently, implementation of the claims modernization program, an important project that directly affects the public, is also being delayed.

--Further, SSA has deviated from the SMP's approach in the Data Base Integration Program. While SSA has made progress

under this program, it has deviated from the original plan's approach by developing a data base architecture concept that appears not to be within the current state of the art. Not pursuing a realistic state-of-the-art concept may increase the time it takes to develop the data base architecture. Timely completion of the integrated data base is important because it will allow SSA to more efficiently access, retrieve, and maintain data and possibly avoid future adverse impact on performance of major applications, such as beneficiary payments.

A crucial part of the plan--the Software Engineering Program--is behind schedule and SSA has not fully implemented its original approach to software development. The successful implementation of the Software Engineering Program is important because it included improvements to all major SSA software systems. These systems pay beneficiaries, issue Social Security cards, collect overpayments, and record and maintain each individual's earnings. The Software Engineering Program's original approach was in three phases fundamental to effective system redesign: first, develop software standards and monitor them to ensure the standards are followed; second, improve software by documenting existing systems; and third, design and build the new systems. Such an approach makes it easier to change existing software and provides a strong foundation and proper environment for developing new software systems. SSA's current approach has been to redesign systems before completely establishing software development standards and improving its existing software. This approach is inherently risky because it calls for new systems to be designed before completing important software improvement tasks fundamental to effective redesign. Without the appropriate software foundation, SSA will continue to experience difficulty in improving and stabilizing the existing software and effectively redesigning new software. Consequently, continued software problems will adversely affect SSA's ability to effectively serve the public.

SSA has taken some of the necessary management actions to improve the ADP personnel situation. However, it still is having difficulty attracting and retaining personnel in the necessary numbers and with the appropriate skills. This problem has adversely affected, and we believe will continue to, affect, in part, the plan's progress. Further, ineffective management has contributed to certain problems experienced in the plan's implementation. The most noteworthy is that SSA management de-emphasized the critical importance of the Software Engineering Program, and thus did not not accomplish fundamental tasks. SSA also did not properly monitor and implement the integration, planning, and control functions among the plan's four programs. Managing the integration of the major SMP programs is critical because of their interdependencies. In addition, the integration

function is magnified by the complexity of individual tasks within each program, such as the coordination of software improvement and redesign projects within the Software Engineering Program.

Without effective management of system integration, SSA will experience adverse effects in implementing the most challenging aspect of the SMP--integrating the diverse and complex tasks associated with the redesigned systems of the four major state-of-the-art programs. The ultimate consequence will be the prevention of SSA's major modernization goal, i.e., restoring excellence to its ADP systems.

In summary, while SSA has made progress in implementing the SMP there is much to be done. The lag in the Data Communications Utility program and the problems with the Data Base Integration Program, coupled with the high-risk approach used to improve and redesign software, leaves SSA vulnerable to another potential system crisis in the 1990s.

SSA indicated to us in a September 6, 1985 briefing that it intends to "revamp" certain approaches in implementing the modernization plan. Specifically, SSA indicated that it intends to develop a strategy to put priority on the systems engineering environment and on software improvement projects in addition to strengthening the plan's integration functions. We believe there are a number of actions that SSA should take as part of that effort.

RECOMMENDATIONS

We recommended on August 30, 1985, that SSA perform a risk analysis on the approach it was taking on the Software Engineering Program.[1] In light of the fact that SSA has decided to "revamp" its systems modernization approach, we continue to believe that an analysis of risks and benefits should be factored into its present strategies and approaches to modernizing its systems.

We recommend that the Secretary of Health and Human Services direct SSA to

--Complete the survival and transition phases contained in the 1982 plan, adhering to the phased approach and sequencing of

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[1]Social Security Administration's Progress in Modernizing Its Computer Operations (GAO/IMTEC-85-15, Aug. 30, 1985).

tasks. Specific attention should be given to establishing the software engineering environment proceeding with software improvement and redesign tasks by:

1. improving the guidance in its software engineering technology to more fully explain procedures and standards for improving and developing systems;

2. implementing a quality-monitoring mechanism to ensure the Software Engineering Technology manual is properly followed;

3. performing software improvements, including documentation of existing systems to define systems requirements. The requirements should be used to support the software redesign efforts.

--For the Data Base Integration program, conduct a comprehensive risk analysis of its data base architecture concept. This analysis should include:

1. whether the current concept represents a state-of-the-art system;

2. the probability of the concept's success and related timeframes for its completion;

3. the risks associated with accomplishing software-system redesign prior to establishing the data base architecture.

--For the Data Communications Utility program, ensure that the task to procure and implement a nationwide communications network is coordinated with the systems' software redesign projects to avoid developing ineffective software.

--To improve the overall management of the modernization plan, develop an action plan for correcting the management deficiencies that currently exist in the plan's integration efforts. This plan should address ways to more effectively monitor and control activities among the programs within the modernization plan.

--Report to the Congress on the detailed strategies and plans to the revised systems modernization approaches and the results of the data base architecture risk analysis.

GOALS OF

SSA' SYSTEMS MODERNIZATION PLAN

SSA specified the following goals in the text of the 1982 SMP.

--To restore excellence to the Social Security Administration Systems.

--To avoid potential disruption of client service through immediate improvements to critical system deficiencies.

--To improve client service by providing responsive, complete data at the District Office for programs affecting each person.

--To restore integrity and public confidence in the benefit payment system by assuring system accountability, auditability and detection of potential fraud, abuse and errors.

--To improve the quality and timeliness of data processing through the elimination of backlogs, error reduction, reduced tape handling and process redesign.

--To improve staff effectiveness by reducing turnover, increasing professional training and improving the working environment.

--To improve productivity of data entry, case processing, operations and software development by automation, improved work procedures, and management controls.

--To close the technology gap in systems architecture through the utilization of mass storage, data base management, on-line data retrieval, and other modern ADP and telecommunication technologies.

GOVERNING STRATEGIES OF

SSA'S SYSTEMS MODERNIZATION PLAN

The 1982 SMP contained the following 9 strategies and their rationale.

1. TO ACHIEVE MODERNIZATION THROUGH INCREMENTAL AND EVOLUTIONARY IMPROVEMENTS.

   The alternative to evolutionary development is a complete redesign. The risk of failure of a total system redevelopment is unacceptable, and if attempted, the job may never be completed at any cost. The fragile condition of the SSA system and the day-to-day struggle to meet minimum mission requirements deny the luxury of time to tear it down and start anew. The only sure way to system modernization is to define manageable increments of improvement and evolve the new SSA beneficiary payment system without jeopardy of service to the public.

2. TO SEPARATE THE MODERNIZATION PROGRAM FROM ONGOING OPERATION AND MAINTENANCE RESPONSIBILITIES.

   In the past, responsibilities for operations and maintenance have been given to the same staff which was also assigned the job of system design and development. By doing so, management caused a conflict over the use of resources which forced the scarce technical staff to give top priority to day-to-day operational crises and postpone, year after year, the needed system improvements. The only practical approach for the implementation of the modernization program is to remove this conflict by expanding the organization to add a new component dedicated to the execution of the plan, thereby, directing the existing organization towards more efficient and productive system operations and maintenance activities.

3. TO ACHIEVE PROJECT CONTINUITY BY USE OF A SYSTEM INTEGRATION CONTRACTOR FOR THE DURATION OF THE PLAN.

   Plans of the past have failed due to long standing planning and management weaknesses, reorganizations, and redirection of system development efforts mid-stream without the full realization of the resources invested. Due to this history, and the nature of shifts in leadership and turnover in the Government, this plan recognizes the value of the role of an integration contractor who will assist SSA in planning, managing and giving continuity to the implementation of the modernization program throughout its life cycle of development.

4. TO OBTAIN AND UTILIZE PROVEN STATE-OF-THE-ART SYSTEMS ENGINEERING TECHNOLOGY AND RESOURCES FROM INDUSTRY.

   Major technological changes have occurred and staffing shortages have existed leaving SSA well behind the state-of-the-art in data processing, with the remaining staff becoming increasingly unable to keep up as a result of the archaic technology in use. The modernization plan cannot be implemented without the state-of-the-art system engineering technology available in industry nor the up-to-date technicians within SSA who have moved ahead with the times. The intent of the plan is to transfer the current proven technology from industry to SSA and utilize modern, dependable data processing techniques.

5. TO SELECT BOTH SHORT-TERM AND LONG-RANGE APPROACHES THAT MINIMIZE RISKS AND SALVAGE INVESTMENT BY BUILDING ON EXISTING SYSTEMS.

   SSA has been severely criticized for meeting its day-to-day system crises with a patchwork of system fixes, and at the same time, producing plans which were not coordinated or implementable. Strategies for system development have stressed hardware procurements....which ignored fundamental system design problems, or the long-range "process redesign" which didn't take into account the critical prerequisites needed for an orderly transition to the SSA future system. The strategies of the past have failed because they lacked basic solutions to the current problems, or the high risk of completion was unacceptable. A practical approach for today is to select both short-term improvements which can be accomplished without high risk and fit these increments into a long-range approach which salvages the investment of the past 20 years.

6. TO LIMIT DESIGN CHANGES TO ONLY CRITICAL, USER DEFINED NEEDS DURING SOFTWARE IMPROVEMENT AND PROCESS REDESIGN.

   New applications or program redesign must be limited during the period that technical improvements are being made to the software because of competition for resources to do both, and the unmanageable control of the software configuration. The modernization plan permits the implementation of only critical needs due to legislative mandates while maximum effort is applied to transforming the software into a form which permits controlled development.

7. TO RECONFIGURE SYSTEM ARCHITECTURE TO TAKE FULL ADVANTAGE OF ADVANCED TECHNOLOGY.

   Without the newer technology SSA cannot respond to changes quickly, operate its system efficiently or take advantage of cost saving automation features. But, with a relatively simple reconfiguration of computers and a shift to more modern data storage equipment, SSA can eliminate labor intensive operations and improve system performance immediately.

8. TO FOLLOW AN ACQUISITION STRATEGY WHICH PERMITS UPGRADING TECHNOLOGY WITHIN A CODE COMPATIBLE ARCHITECTURE.

   The lack of long-range planning for technology advancements has forced SSA into a restricted procurement posture....Ancient software precludes upgrading to the newer technology. SSA can free itself from being tied to a single system architecture by upgrading and improving software within the current architecture, and using code compatible procurements for new hardware instead of attempting a massive conversion effort that would syphon off all available resources and prevent the use of existing peripheral equipment. Once having good software, SSA will again be in a position to take advantage of wide open procurements for later technological advancements.

9. TO ESTABLISH A SINGLE ORGANIZATIONAL BODY TO PLAN, MANAGE AND CONTROL THE MODERNIZATION PROGRAM.

   GAO has repeatedly pointed to inadequate management and planning for ADP system modifications. As a result, SSA created several planning projects with different organizations without a coordinated effort or plan of implementation. Since this modernization plan is a coordinated program of ADP improvements, it depends on the existence of a single management body for execution and control which is staffed by experienced SSA managers and staff who know how to accomplish their objectives in the SSA environment.

APPENDIX III

MAJORITY MEMBERS
JACK BROOKS TEX CHAIRMAN
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NINETY-EIGHTH CONGRESS

Congress of the United States

House of Representatives

COMMITTEE ON GOVERNMENT OPERATIONS
2157 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, D.C. 20515

July 28, 1983

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DAN SCHAEFER COLO

MAJORITY—225-5051
MINORITY—225-5074

The Honorable Charles A. Bowsher
Comptroller General
General Accounting Office
Washington, D.C. 20548

Dear General:

As you know, I have had a long-standing interest in assuring that the Social Security Administration (SSA) has the necessary computer processing capabilities to adequately fulfill its important mission. Notwithstanding SSA's early use of automation, the agency has mismanaged these critical resources over the last decade to a point of near collapse. As such, SSA is faced with an outdated computer system that can barely meet its mission -- an intolerable situation for an agency that affects so many of our citizens.

Over a year ago, SSA began implementing a $500 million plan to resolve its chronic computer problems and move SSA to state-of-the-art technology. At the time, the Committee expressed its concern that the plan may not meet SSA's needs and, even if successful, full implementation may only delay the most pressing problems facing SSA -- software and personnel. Recent public accounts of the allegations concerning the $100 million Paradyne contract once again raise serious concerns over the management of SSA's computer resources. I therefore request that GAO undertake an immediate and comprehensive investigation of SSA's activities to determine if: (1) The $500 million survival plan is on schedule and is being fully implemented, (2) The software upgrade proposed in the plan is adequate and on schedule, and (3) SSA has taken the necessary management actions to improve its personnel situation.

I also request that GAO thoroughly review all Paradyne contracts to ascertain if the recent allegations of possible fraud and misrepresentation have merit and, if so, what actions should be taken to correct the situation. I am also interested in the software contract awarded to Paradyne and then allegedly passed on to a subcontractor in its entirety. During its review, GAO should also determine if any violations of Federal law have occurred. Due to the importance of this investigation, I would appreciate it if you could brief the Committee on the results of the Paradyne review within two months and on the overall review within six months.

With best wishes, I am

Sincerely,

JACK BROOKS
Chairman

GAO NOTE: As agreed with the Chairman, we first concentrated our efforts on examining the Paradyne contracts. After issuing two reports on this subject, we began work on the remainder of his request in December 1984.